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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/579,072	05/11/2006	Victor Dumenko	10400-000235/US	3356

30593 7590 04/03/2009
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EXAMINER	
MERSHON, JAYNE L	

ART UNIT	PAPER NUMBER
4111	

MAIL DATE	DELIVERY MODE
04/03/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/579,072	DUMENKO ET AL.	
	Examiner	**Art Unit**	
	Jayne Mershon	4111	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☒ Claim(s) *21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/11/2006*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

Claims 1-21 are pending and are examined below.

Claim Objections

Claim 21 is objected to because of the following informalities: Consider changing "shock tub" to "shock tube". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, a method of compressing anode, cathode, and electrolyte layers sequentially into a shell is stated as a limitation. The specification is indefinite as to what compressed means. There is no indication as to how compacted the substances must be in order to be considered compressed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 1-8, 10-12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voyentzie et al. (U.S. Pat. No. 3,750,584) in view of Crompton (Thermal Batteries, Battery Reference Book, SAE International, chapter 27, pages 27/3-13, 1996).

Regarding claim 1, Voyentzie et al. teach a heat activated power source (see figs. 1, 2, 3 and 4 below) comprising:

an electrically conductive shell (44 and 46) extended along a longitudinal axis (see col. 2, lines 13-14); a heat activated electrolyte element (40); a cathode element (not shown); wherein said anode element (not shown), said electrolyte element, and said cathode element are stacked in said order along said longitudinal axis in said shell, and as a whole form an unitary body (30) (see col. 2, lines 24-29 and lines 34-36);

wherein said heat activated electrolyte element is switchable from an ion-isolative ground state to an ion-conductive active state by means of a heat energy pulse exceeding a threshold energy level (see col. 2, lines 51-59);

wherein a first element (38 and 46) of said anode element and said cathode element is an electrode element that is electrically insulated from said shell (see fig. 3 below); and

wherein a second element (32) of said anode element and said cathode element is electrically

interconnected with said shell (see figs. 2 and 3 below) and [the first element] comprises a heat energy amplifying material (74) that is operative to ignite in response to a heat energy signal lower than said threshold energy level and, when ignited, to provide said electrolyte element with a heat energy pulse exceeding said threshold energy level (see col. 3, line 61 through col. 4, line 8); such that said electrode element and said shell form two terminals (16) between which a voltage is supplied when a heat energy signal lower than said threshold energy level is received by said second element (see col. 2, lines 13-24 and col. 4, line 61 through col. 5, line 2).

Voyentzie et al. does not teach wherein the second element (32), which is electrically connected to the shell, is the electrode comprising a heat energy amplifying material (74), i.e. it is the first element (38 and 46), which is not connected to the shell, that is the electrode comprising a heat energy amplifying material (74).

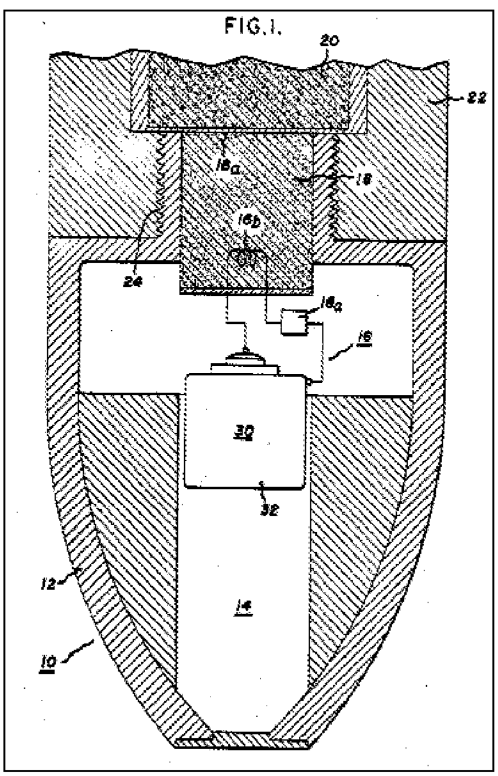


FIG.1.

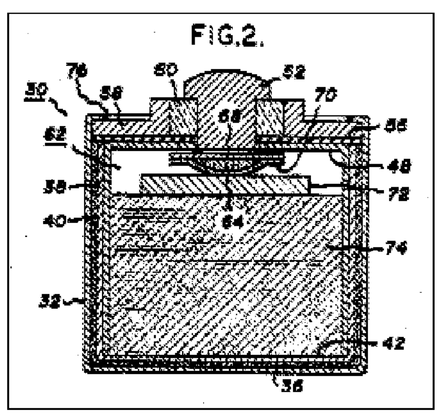
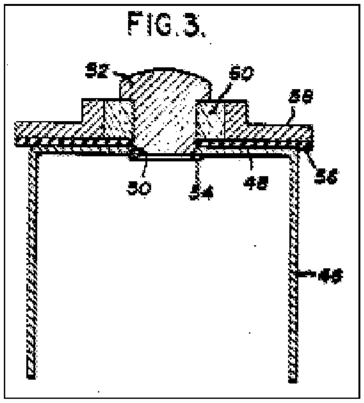
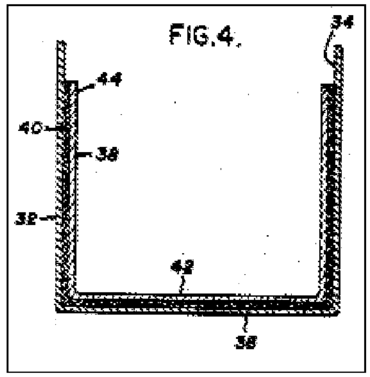


FIG.2.





Crompton et al. teach the heat activation can be with the anode or cathode and in multiple configurations (see figs. 27.5 and 27.8 below and page 27/5, first column, top paragraph and 2nd column, last paragraph).

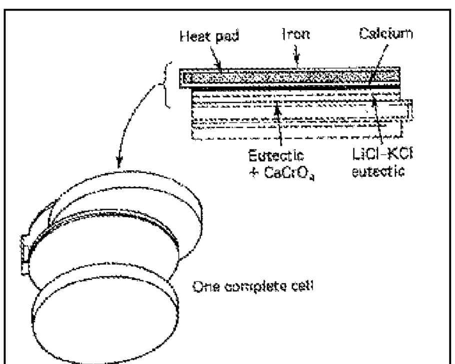


Figure 27.5 Construction of an open pellet cell (Courtesy of Catalyst Research Corporation)

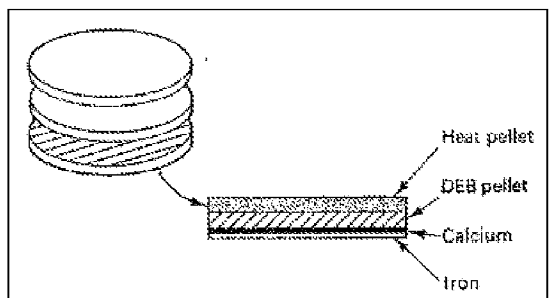


Figure 27.8 Construction of a heat pellet–DEB pellet cell (Courtesy of Catalyst Research Corporation)

In Voyentzie et al., the anode element which is electrically connected to the shell did not comprise a heat amplifying material, but Voyentzie et al. teach numerous variations are possible for the thermal cell (see col. 5, lines 33-35). In figure 27.5, Crompton shows one configuration where the anode element comprises a heat amplifying material (i.e. calcium is the anode). Crompton teaches the configuration of the thermal battery is based upon evolution of the

technology and the use of the battery. In particular, the open cell as shown in fig. 27.5 is desired for the simplicity of the cell configuration (see page 27/4, 2nd column, last paragraph).

Therefore, it would be obvious to replace the thermal battery configuration in Voyentzie et al. with the thermal battery configuration in Crompton, where the anode element comprises a heat amplifying material, because of the simpler cell design, the result of having the heat amplifying material next to the anode instead of the cathode is functionally equivalent and the resultant electrical current from the heat activated electrolyte is predictable.

Regarding claim 2, Voyentzie et al. teach a heat activated power source wherein there is a first element (32) and wherein there is a second element (38 and 46).

Voyentzie et al. does not teach the first element is the cathode and does not teach the second element is the anode (i.e. in Voyentzie et al., the first element is the anode and the second element is the cathode).

Crompton teaches the orientation of the anode and cathode are interchangeable, i.e. either are able to be associated with the heat amplifying material and therefore form the first of two terminals (see claim 1 and Crompton figs. 27.5 and 27.8).

Reversal of parts where the functionality is maintained and the result is predictable is not obvious (see MPEP § 2144.04).

Therefore, it would be obvious to a person having ordinary skill in the art to modify the first and second element in Voyentzie et al. so that the first element (32) forms the cathode and the second element (38 and 46) forms the anode because multiple configurations of a thermal cell are known in the art and the reversal of the anode and cathode would predictably maintain the functionality of the thermal cell.

Regarding claim 3, Voyentzie et al. teach a heat activated power source wherein the anode element is said first element (32) and wherein the cathode element is said second element (38 and 46) (see col. 2, lines 64-66 and col. 3, lines 7-9).

Regarding claim 4, Voyentzie et al. teach a heat activated power source wherein said heat activated electrolyte element comprises a compound that is chosen from the group consisting of $LiAlCl_4$, $LiBF_4$, LiCl, and LiBr (see Col. 2, lines 54-59, i.e. lithium chloride).

Regarding claim 5, Voyentzie et al. teach a heat activated power source wherein said heat activated electrolyte element comprises a granulated compound or a compound in a crystalline or polycrystalline state (see col. 2, lines 61-64).

Regarding claim 6, Crompton et al. teach a heat activated power source wherein said cathode element comprises a compound that is chosen from the group consisting of tungsten, molybdenum, tin lead, platinum, palladium, silver, and gold (see page 27.4, 27.1.1 Configurations, 2nd paragraph, i.e. tungstic oxide and 3rd paragraph, i.e. tungstic oxide).

Regarding claim 7, Voyentzie et al. teach a heat activated power source wherein said cathode element comprises a compound that is chosen from the group consisting of: aluminum, zinc, magnesium, and iron (see col. 3, lines 4-7, i.e. ferric oxide).

Regarding claim 8, Voyentzie et al. teach a heat activated power source wherein said anode element comprises a compound that is chosen from the group consisting of: aluminum, zinc, magnesium, and iron (see col. 2, line 66 through col. 3, line 4, i.e. magnesium).

Regarding claim 10, Voyentzie et al. teach a heat activated power source wherein said anode element is constituted by a solid body (see col. 3, lines 2-4).

Regarding claim 11, Voyentzie et al. teach a heat activated power source wherein said second element (i.e. cathode) comprises an ionically active material (i.e. ferric oxide) other than the heat energy amplifying material (i.e. mixture of barium, chromate and zirconium) (see col. 3, lines 4-9 and col. 4, lines 4-8).

Regarding claim 12, Crompton teaches a heat activated power source wherein an element comprises one homogenous material only, which is heat energy amplifying and ionically active (see page 27.5, 2nd column, last paragraph).

Crompton teaches the power source with the homogenous material as an element has several advantages including ease of assembly (i.e. cannot be misassembled), low cost, high dynamic stability and suitability for longer life (storage life) (see page 27.5, 2nd column, last paragraph).

Therefore, it would be obvious to a person having ordinary skill in the art to modify the heat amplifying material and the electrolyte material in Voyentzie et al. to the homogenous material in Crompton because of the ease of assembly, cost and longer storage life (see page 27.5, 2nd column, last paragraph).

Regarding claim 15, Voyentzie et al. teach a heat activated power source wherein said electrolyte element requires a temperature above 200°C in order to change state from said ion-isolative ground state to said ion-conductive active state (see col. 2, lines 54-59).

Regarding claim 16, Voyentzie et al. teach a detonator (i.e. terminal assembly, see col. 3, lines 36-40 and lines 62-67) comprising a heat activated power source (30) and electronic delay circuitry (16), and a pyrotechnical detonator charge (18), wherein said electronic delay circuitry (i.e. diode, see col. 4, lines 64-67) is operative to input electrical current from said power source

and to output an electrical initiation signal initiating said pyrotechnical detonator charge (see col. 4, line53 through col. 6, line 2).

Regarding claim 17, Voyentzie et al. teach a detonator further comprising an initiator that is operative to initiate said electrical initiation signal (see col. 4, lines 65-68, i.e. detonating fuse charge).

2. Claims 9 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voyentzie et al. and Crompton as applied to claim 1 above, and further in view of Erbacher et al. (U.S. Pat. No. 4,207,388).

Regarding claim 9, Crompton teaches a heat activated power source wherein said anode element comprises a compound (see page 27/4, 2nd column, last paragraph through page 27/5, 1st column, first paragraph).

Crompton teaches pellet construction, but does not teach the anode is in the form of compressed powder.

Erbacher et al. does teach wherein the anode is in the form of compressed powder (see Table I, col. 3, lines 64-68).

Erbacher et al. teach the evolution of thermal battery cell design starting with the cup design, followed by the palletized cell shown in Crompton, followed by the completely palletized cell after continued research, the method of which is taught by Erbacher et al. (see col. 1, lines 33-39). Erbacher et al. teach this method is an alternative to where the anode is a sheet (see col. 4, lines 31-34).

Crompton teaches the palletized configuration is desired for the simple cell design (see discussion for claim 1 and Crompton page 27/4, 2nd column, last paragraph).

Therefore, it would be obvious to a person having ordinary skill in the art to modify the anode in Crompton with the compressed powder anode of Erbacher et al. because Erbacher et al. teaches a more advanced fabrication method where the entire cell can be palletized and that the methods are alternative to one another with a predictable result.

Regarding claim 21, Crompton teaches a method of manufacturing a heat activated power source with each of the first element, the second element, and the electrolyte element.

Crompton does not teach wherein each element is separately pressed into the shell.

Erbacher et al. does teach wherein each element is separately pressed into the shell (see col. 4, lines 18-31). Even though the pressing was performed in a die for the example, the shell is the equivalent of a die if used for pressing the elements. Erbacher et al. teach thermal battery containers are well known in the art and are not discussed.

See obviousness discussion for claim 9.

3. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Voyentzie et al. and Crompton as applied to claim 1 above, and further in view of Daoud (U.S. Pat. No. 6,818,344).

Regarding claim 13, Voyentzie et al. teach a heat activated power source further comprising electrically insulating washers (56 and 60) insulating said first element from the shell.

Voyentzie does not teach the insulating device is a sleeve that surrounds the first element.

Daoud teaches a pelletized configuration as taught in Crompton (see obviousness discussion for claim 1). Daoud teaches an insulating device that is a sleeve (43) that surrounds one element insulating it from the shell, while the other element is in contact with the shell (see fig. 1, col. 7, lines 1-6).

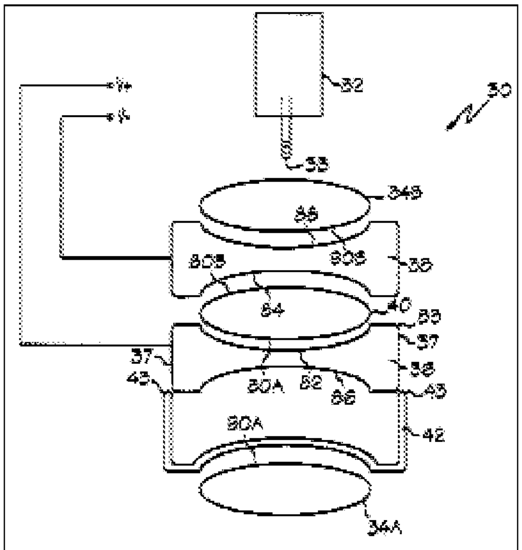


FIG. 1

Both Voyentzie et al. and Daoud teach insulation of one element from the other element and surrounding container. The Courts have held that the selection of a known material, which is based upon its suitability for the intended use, is within the ambit of one of ordinary skill in the art. See *In re Leshin*, 125 USPQ 416 (CCPA 1960) (*see also* MPEP § 2144.07).

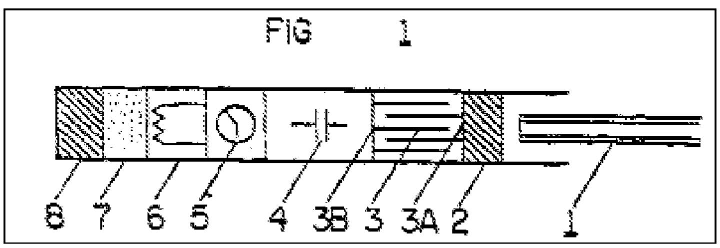
Therefore, it would be obvious to a person having ordinary skill in the art to modify the washer in Voyentzie et al. with the sleeve of Daoud because both serve the purpose of insulating the cathode from the electrode and the result is predictable.

4. Claims 14, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voyentzie et al. and Crompton as applied to claim 1 and 16 above, and further in view of Falquete (U.S. Pat. No. 5,942,718).

Regarding claim 14, Voyentzie et al. teach a heat activated power source wherein said second element is operative to ignite by a heat energy signal supplied from a shock (see col. 4, lines 52-57).

Voyentzie et al. does not teach the shock is provided by a shock tube.

Falquete et al. does teach a heat activated power source wherein a shock tube (1) provides the initiation by a heat energy signal (see fig. 1, col. 3, lines 24-32).



In Voyentzie et al., the shock is provided by the firing of the projectile. If the explosive is not fired, an alternate source of the shock is required. Flaquete et al. teach shock tubes are well known in the art. Shock tubes, a non-electric detonator, is used to eliminate the hazards associated with electric detonators (see col. 1, lines 42-45).

Therefore, it would be obvious to a person having ordinary skill in the art to modify the source of the shock in Voyentzie et al. with the shock tube taught by Falquete et al. because shock tubes are well known in the art and are a safer alternative to electric detonators.

Regarding claim 18, Voyentzie et al. teach a detonator with electronic delay circuitry (i.e. diode, see col. 4, lines 65-66).

Voyentzie et al. does not teach the circuitry includes a capacitor.

Falquete et al. does teach a detonator wherein the electronic delay circuitry comprises a capacitor (4) operative to store electrical current from the power source during a delay time of said electronic delay circuitry (see fig. 1, col. 3, lines 33-39).

Falquete et al. teach delay detonators of the type taught is known in the art and suitable for rock blasting, mining, tunnel opening, implosions, or controlled blastings. Falquete et al. teach the circuitry is an improvement in safety and precision concerning time delays for detonators.

Therefore, it would be obvious for a person having ordinary skill in the art to modify the diode in Voyentzie et al. with the capacitor in Falquete et al. because the capacitor is more suitable for certain types of explosions and the delay circuitry represents an advancement in safety and precision.

Regarding claim 19, Voyentzie et al. teach a detonator further comprising a metallic capsule containing said power source and furthermore forming part of the power source shell, whereby the metallic capsule serves as an electrical connector element between the second element of said power source and said electronic delay circuitry.

Voyentzie et al. does not teach the metallic capsule contains the electronic delay circuitry or the detonating charge.

Falquete et al. teach a detonator (see fig. 1) comprising a capsule containing said electronic delay circuitry (4), said power source (3), and said detonating charge 6), and furthermore forming part of the power source shell (see figs. 1 and 4 and the abstract, i.e. "battery packed inside the detonator shell").

Voyentzie et al. does teach a second shell (12) that comprises the power source, electronic delay circuitry, and the detonating charge. Falquete et al. teach a single shell.

The Courts have held that making parts integral (i.e. the shell of the detonator extended to be the shell of the thermal battery) is obvious over a prior art reference which teach the parts separately but are secured together as a single unit. See *In re Larson*, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965). (See also MPEP 2144.04 V. B.)

Therefore, it would be obvious to a person having ordinary skill in the art to modify the shell taught by Voyentzie et al. to be an integral whole with the detonator shell as taught by Falquete et al. because separate parts held together as a single unit by a second shell is functionally and predictably equivalent to a single shell encasing the parts.

Regarding claim 20, Falquete et al. teach a detonator system and shock tube, wherein the shock tube is interconnected with said power source and, is operative to ignite said second element in said heat activated power source (see col. 3, lines 24-31). See obviousness discussion for claim 14.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jayne Mershon whose telephone number is (571) 270-7869. The examiner can normally be reached on 9:00 AM to 5:00 PM; alt. Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

JLM